

5     WHAT IS CLAIMED IS:

1.     A functionalized porous crystalline material exhibiting an X-ray diffraction pattern with at least one peak at a position greater than about 1.8 nm d-spacing with a relative intensity of 100, wherein said crystalline material  
10     comprises a framework including metal atoms, oxygen atoms and at least one organic group bonded between at least two of said metal atoms so as to be integral with said framework, and wherein said organic group has at least one sulfonate moiety bonded thereto.
- 15             2.     The porous crystalline material of claim 1, wherein said metal atoms are selected from silicon, germanium, tin, boron and mixtures thereof.
3.     The porous crystalline material of claim 1, wherein said metal  
20     atoms are silicon.
4.     The porous crystalline material of claim 1, wherein said organic group is selected from an alkylene group, alkenylene group, a vinylene group, an alkynylene group, a phenylene group and a hydrocarbon containing a phenylene group.  
25
5.     The porous crystalline material of claim 1, wherein said organic group is an alkylene group having 1 to 6 carbon atoms and said metal atoms are attached to the same carbon atom or to adjacent carbon atoms.
- 30             6.     A process for producing the inorganic, porous crystalline material of claim 1, comprising the step of polycondensing an organometallic compound in the presence of a surfactant, wherein the organometallic compound includes an organic group bonded to at least two metal atoms and at least two

5 hydrolysable groups bonded to each of said metal atoms and wherein said organic group has at least one sulfur-containing moiety bonded thereto.

7. The process of claim 6 wherein three hydrolysable groups bonded to each of said metal atoms.

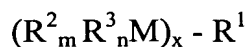
10

8. The process of claim 6 wherein the at least one sulfur-containing moiety is a sulfonate moiety.

9. The process of claim 6 wherein the at least one sulfur-containing moiety is a precursor to a sulfonate moiety and the process includes the additional step of converting said precursor to a sulfonate moiety.

10. The process of claim 6 wherein the organometallic compound has the formula:

20



wherein

25

M is a metal atom;

R<sup>1</sup> is a hydrocarbyl group having at least one sulfur-containing moiety, with the metal atoms M being connected to the same carbon atom or to adjacent carbon atoms;

30

R<sup>2</sup> is a hydrolysable group, such as an alkoxy group or a halide;

R<sup>3</sup> is a hydrocarbyl group or hydrogen;

35

m is an integer of at least 2;

5                    n is an integer of 0 or more obtained by subtracting (m+1) from the valency of the metal atom M; and

                  x is an integer of at least 2.

10                  11. The process of claim 10 wherein said hydrocarbyl group is a C1-C6 hydrocarbyl group.

                  12. The process of claim 6 wherein said surfactant has the formula  $R_1R_2R_3R_4Q^+$  wherein Q is nitrogen or phosphorus and wherein at least  
15        one of  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  is aryl or alkyl group of from about 6 to about 36 carbon atoms, the remainder of  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  being selected from hydrogen, alkyl of from 1 to 5 carbon atoms and combinations thereof.

                  13. The process of claim 6 wherein said surfactant is selected  
20        from cetyltrimethylammonium, cetyltrimethylphosphonium, decyltrimethylammonium octadecyltrimethylammonium, octadecyltrimethylphosphonium, cetylpyridinium, benzyltrimethylammonium and dimethyldidodecylammonium cations.

25                  14. The process of claim 6 wherein the molar ratio of organometallic compound to surfactant is between 1:0.12 and 1:0.24

                  15. The process of claim 6 wherein the molar ratio of organometallic compound to surfactant is between 1:0.12 and 1:0.18.